

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

FUNKE *et al.*

Appl. No.: 10/581,447

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For: **Active Substance Combinations
Having Insecticidal and Acaricidal
Properties**

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Commissioner for Patents
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I, Wolfram Andersch of 51469 Bergisch Gladbach, Schlodderdicher Weg

77, a citizen of Germany, hereby declare:

1. that I received the doctor's degree in biology from the University of Göttingen, Germany, in 1983;
2. that I am now an employee of Bayer CropScience AG¹ in Germany as a biologist;
3. that I have specialized in the field of plant protection; and
4. that the following tests have been carried out under my supervision and control.

¹ Bayer CropScience AG is the assignee of the above-captioned application.

5. The expected efficacy of a given combination of two compounds is calculated as follows (see Colby, S.R., "Calculating Synergistic and Antagonistic Responses of Herbicide Combinations," Weeds 15, pp. 20-22, 1967):

If

X is the efficacy expressed in % mortality of the untreated control for test compound A in a concentration of m ppm, or at an application rate of m g/ha,

Y is the efficacy expressed in % mortality of the untreated control for test compound B in a concentration of n ppm, or at an application rate of n g/ha,

E is the efficacy expressed in % mortality of the untreated control using the mixture of A and B in a concentration of m and n ppm, or at an application rate of m and n g/ha,

$$E = X + Y - \frac{X \cdot Y}{100}$$

6. If the observed insecticidal efficacy of the combination is higher than the one calculated as "E," then the combination of the two compounds is more than additive, *i.e.*, there is a synergistic effect.

Example A

7. *Aphis gossypii* - Test (Dip application)

Solvent: 7 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Cotton leaves (*Gossypium herbaceum*) which are heavily infested by the cotton aphid (*Aphis gossypii*) are treated by being dipped into the preparation of the active compound of the desired concentration. After the specified period of time, the mortality in % is determined. 100

% means that all the aphids have been killed; 0 % means that none of the aphids have been killed. In this test, the following combination according to the present application demonstrates a synergistic effect as shown in Table A.

8. Table A: *Aphis gossypii* – Test

<u>Active Ingredient</u>	<u>Concentration (ppm)</u>	<u>Efficacy (% after 1 day)</u>
II-1-4	20	10
Buprofezin	100	0
II-1-4+ Buprofezin (1 : 5) according to the invention	20 + 100	obs.* cal.** 40 10

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

Example B

9. *Myzus persicae* - Test (Spray application)

Solvent: 78 parts by weight of acetone
1.5 parts by weight of dimethylformamide
Emulsifier: 0.5 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Cabbage leaves (*Brassica oleracea*) which are heavily infested by the green peach aphid (*Myzus persicae*) are treated by being sprayed with the preparation of the active compound at the desired concentration. After the specified period of time, the mortality in % is determined. 100 % means that all the aphids have been killed; 0 % means that none of the aphids have been killed. In this test, the following combinations according to the present application demonstrate synergistic effects as shown in Tables B1 and B2.

10. Table B1: *Myzus persicae* - Test (Spray application)

<u>Active Ingredient</u>	<u>Concentration (g/ha)</u>	<u>Efficacy (% after 1 day)</u>
II-1-54	4	10
II-1-12	4	30
Buprofezin	100	0
Flonicamid	100	70
II-1-54 + Flonicamid (1 : 25) according to the invention	4 + 100	obs.* cal.** 90 73
II-1-12 + Buprofezin (1 : 25) according to the invention	4 + 100	obs.* cal.** 80 30

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

11. Table B2: *Myzus persicae* - Test (Spray application)

<u>Active Ingredient</u>	<u>Concentration (g/ha)</u>	<u>Efficacy (% after 6 days)</u>
II-1-54	4	70
II-1-12	0.032	0
II-1-4	0.032	0
Buprofezin	100	0
(I-a-4)	0.8	0
II-1-54 + Buprofezin (1 : 25) according to the invention	4 + 100	obs.* cal.** 99 70
II-1-12 + (I-a-4) (1 : 25) according to the invention	0.032 + 0.8	obs.* cal.** 40 0
II-1-4 + (I-a-4) (1 : 25) according to the invention	0.032 + 0.8	obs.* cal.** 80 0

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

12. *Myzus persicae* - Test (Dip application)

Solvent: 7 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Cabbage leaves (*Brassica oleracea*) which are heavily infested by the green peach aphid (*Myzus persicae*) are treated by being dipped into the preparation of the active compound of the desired concentration. After the specified period of time, the mortality in % is determined. 100 % means that all the aphids have been killed; 0 % means that none of the aphids have been killed. In this test, the following combinations according to the present application demonstrate synergistic effects as shown in Tables B3 and B4.

13. Table B3: *Myzus persicae* - Test (Dip application)

<u>Active Ingredient</u>	<u>Concentration</u> <u>(ppm)</u>	<u>Efficacy</u> <u>(% after 1 day)</u>
II-1-4	4	65
Flonicamid	4	45
(I-a-4)	4	0
II-1-4 + Flonicamid (1 : 1) according to the invention	4 + 4	obs.* cal.** 95 80.75
II-1-4 + (I-a-4) (1 : 1) according to the invention	4 + 4	obs.* cal.** 85 65

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

14. Table B4: *Myzus persicae* - Test (Dip application)

<u>Active Ingredient</u>	<u>Concentration (ppm)</u>	<u>Efficacy (% after 6 days)</u>
II-1-9	4 0.8	30 0
Buprofezin	100	5
(I-a-4)	4	80
II-1-9 + Buprofezin (1 : 125) according to the invention	0.8 + 100	obs.* cal.** 35 5
II-1-9 + (I-a-4) (1 : 1) according to the invention	4 + 4	obs.* cal.** 98 86

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

Example C15. *Phaedon cochleariae* larvae - Test (Spray application)

Solvent: 78 parts by weight of acetone
1.5 parts by weight of dimethylformamide

Emulsifier: 0.5 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Cabbage leaves (*Brassica oleracea*) are treated by being sprayed with the preparation of the active compound in the desired concentration and are infested with larvae of the mustard beetle (*Phaedon cochleariae*) as long as the leaves are still moist. After the specified period of time, the mortality in % is determined. 100 % means that all the beetle larvae have been killed; 0 % means that none of the beetle larvae have been killed. In this test, the following combinations according to the present application demonstrate synergistic effects as shown in Tables C1 and C2.

16. Table C1: *Phaedon cochleariae* larvae – Test (Spray application)

<u>Active Ingredient</u>	<u>Concentration</u> (g/ha)	<u>Efficacy</u> (% after 2 days)
II-1-54	0.16	0
II-1-52	0.16	0
II-1-12	4	67
Buprofezin	100	0
Flonicamid	100	17
(I-a-4)	4	0
II-1-54 + Buprofezin (1 : 625) according to the invention	0.16 + 100	obs.* cal.** 50 0
II-1-54 + Flonicamid (1 : 625) according to the invention	0.16 + 100	obs.* cal.** 50 17
II-1-12 + Flonicamid (1 : 25) according to the invention	4 + 100	obs.* cal.** 100 72.61
II-1-52 + (I-a-4) (1 : 25) according to the invention	0.16 + 4	obs.* cal.** 33 0

*obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

17. Table C2: *Phaedon cochleariae* larvae – Test (Spray application)

<u>Active Ingredient</u>	<u>Concentration (g/ha)</u>	<u>Efficacy (% after 6 days)</u>
II-1-54	0.16	17
II-1-52	0.8	50
II-1-1	4	33
II-1-24	4	33
Buprofezin	100	0
Flonicamid	100	17
Pirimicarb	100	0
(I-a-4)	100 4	17 0
II-1-52 + Buprofezin (1 : 125) according to the invention	0.8 + 100	obs.* cal.** 83 50
II-1-52 + Flonicamid (1 : 125) according to the invention	0.8 + 100	obs.* cal.** 67 58.5
II-1-1 + Flonicamid (1 : 25) according to the invention	4 + 100	obs.* cal.** 83 44.39
II-1-52 + Pirimicarb (1 : 125) according to the invention	0.8 + 100	obs.* cal.** 67 50
II-1-1 + Pirimicarb (1 : 25) according to the invention	4 + 100	obs.* cal.** 50 33
II-1-54 + (I-a-4) (1 : 25) according to the invention	0.16 + 4	obs.* cal.** 83 17
II-1-1 + (I-a-4) (1 : 25) according to the invention	4 + 100	obs.* cal.** 100 44.39
II-1-24 + (I-a-4) (1 : 25) according to the invention	4 + 100	obs.* cal.** 83 44.39

*obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

18. *Phaedon cochleariae* larvae – Test (Dip application)

Solvent: 7 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Cabbage leaves (*Brassica oleracea*) are treated by being dipped into the preparation of the active compound of the desired concentration and are infested with larvae of the mustard beetle (*Phaedon cochleariae*) as long as the leaves are still moist. After the specified period of time, the mortality in % is determined. 100 % means that all the beetle larvae have been killed; 0 % means that none of the beetle larvae have been killed. In this test, the following combination according to the present application demonstrates a synergistic effect as shown in Table C3.

19. Table C3: *Phaedon cochleariae* larvae – Test (Dip application)

<u>Active Ingredient</u>	<u>Concentration</u> (ppm)	<u>Efficacy</u> (% after 3 days)
II-1-4	0.16	10
Flonicamid	100	5
II-1-4 + Flonicamid (1 : 625) according to the invention	0.16 + 100	obs.* cal.** 30 14.5

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

Example D

20. *Spodoptera frugiperda* - Test (Spray application)

Solvent: 78 parts by weight of acetone
1.5 parts by weight of dimethylformamide

Emulsifier: 0.5 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Cabbage leaves (*Brassica oleracea*) are treated by being sprayed with the preparation of the active compound of the desired concentration and are infested with larvae of the fall army worm (*Spodoptera frugiperda*) as long as the leaves are still moist. After the specified period of time, the mortality in % is determined. 100 % means that all the caterpillars have been killed; 0 % means that none of the caterpillars have been killed. In this test, the following combinations according to the present application demonstrate synergistic effects as shown in Tables D1 and D2.

21. Table D1: *Spodoptera frugiperda* – test

<u>Active Ingredient</u>	<u>Concentration</u> <u>(g/ha)</u>	<u>Efficacy</u> <u>(% after 2 days)</u>
II-1-54	0.16	33
II-1-4	0.16	17
Buprofezin	100	0
Flonicamid	100	0
II-1-54 + Buprofezin (1 : 625) According to the invention	0.16 + 100	obs.* cal.** 67 33
II-1-4 + Flonicamid (1 : 625) According to the invention	0.16 + 100	obs.* cal.** 50 17

*obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

22. Table D2: *Spodoptera frugiperda* – Test

<u>Active Ingredient</u>	<u>Concentration</u> <u>(g/ha)</u>	<u>Efficacy</u> <u>(% after 6 days)</u>
II-1-54	0.16	83
II-1-52	0.16	50
II-1-4	0.16	83
Pirimicarb	100	0
(I-a-4)	4	0
II-1-4 + Pirimicarb (1 : 625) according to the invention	0.16 + 100	obs.* cal.** 100 83
II-1-54 + (I-a-4) (1 : 25) according to the invention	0.16 + 4	obs.* cal.** 100 83
II-1-52 + (I-a-4) (1 : 25) according to the invention	0.16 + 4	obs.* cal.** 100 50

* obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

Example E23. *Tetranychus urticae* - Test (Spray application)

Solvent: 78 parts by weight of acetone
1.5 parts by weight of dimethylformamide

Emulsifier: 0.5 parts by weight of alkylaryl polyglycoether

To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and emulsifier, and the concentrate is diluted with emulsifier-containing water to the desired concentration. Bean plants (*Phaseolus vulgaris*) which are heavily infested with all stages of the two-spotted spider mite (*Tetranychus urticae*) are treated by being sprayed with the preparation of the active compound at the desired concentration. After the specified period of time, mortality in % is determined. 100 % means that all the spider mites have been killed; 0 % means that none of the spider mites have been killed. In this test, the following combinations according to the present application demonstrate synergistic effects as shown in Table E.

24. Table E: *Tetranychus urticae* – Test

<u>Active Ingredient</u>	<u>Concentration (g/ha)</u>	<u>Efficacy (% after 6 days)</u>
II-1-54	0.032	0
II-1-52	4	0
II-1-24	4	0
II-1-12	4	0
II-1-4	4	0
(I-a-4)	100 0.8	80 20
II-1-54 + (I-a-4) (1 : 25) according to the invention	0.032 + 0.8	obs.* cal.** 40 20
II-1-52 + (I-a-4) (1 : 25) according to the invention	4 + 100	obs.* cal.** 90 80
II-1-24 + (I-a-4) (1 : 25) according to the invention	4 + 100	obs.* cal.** 100 80
II-1-12 + (I-a-4) (1 : 25) according to the invention	4 + 100	obs.* cal.** 100 80
II-1-4 + (I-a-4) (1 : 25) according to the invention	4 + 100	obs.* cal.** 95 80

*obs. = observed insecticidal efficacy

** cal. = efficacy calculated with Colby-formula

25. The undersigned declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed at Monheim, Germany,

27.10.2009

Date



Dr. Wolfram Andersch